

## Description

# METHOD FOR ACCESSING A VARIABLE MEMORY OF AN OPTICAL DISK DRIVE

### BACKGROUND OF INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a method for accessing a variable memory, and more specifically, to a method for accessing a variable memory of an optical disk drive which conserves memory space.

[0003] 2. Description of the Prior Art

[0004] Recently, in order to satisfy requirements of storing a large amount of data, the capacity of storing media has increased rapidly. Among a variety of storage media available, an optical disk is a kind of storage media with low cost, compact size, long persistence, and high density, giving an optical disk the most potential in the future. Optical disks can be divided into compact discs (CD) and digital versatile disks (DVD). CDs can be divided into stan-

dards such as CDDA, VCD, CD-ROM, CD-R, and CD-RW etc., while DVDs can be divided into standards such as DVD-ROM, DVD-R, DVD-RW, DVD+R, DVD+RW, and DVD-RAM etc.

[0005] An optical disk drive first identifies the type of an optical disk, sets up an initial value of some variables required to read the optical disk, and stores these variables into a variable memory. For example, the same variables can be utilized to read CDs of different standards and to write CDs of different standard. In case of DVDs, variables differ according to different standards. For example, the same variables can be utilized to read DVD-ROM, DVD-R, DVD-RW, DVD+R, and DVD+RW, but variables used to write DVD-R and DVD-RW differs from variables used to write DVD+R and DVD+RW. In case of DVD-RAM, the reading variables and writing variables can be utilized to read and write DVD-RAM. Therefore, an optical disk drive predetermines addresses in a variable memory to provide different variables required to read and write optical disks of different types.

[0006] Please refer to Fig.1 showing the data arrangement of a variable memory 12 of a conventional optical disk drive. The optical disk drive (not shown) supports CDDA, VCD,

CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-R, DVD-RW, DVD+R, DVD+RW, and DVD-RAM. The variable memory 12 is for storing variables required to read and write optical disks of different types. As shown in Fig.1, a common reading variable area, a CD reading variable area, a CD writing variable area, a DVD reading variable area, a DVD minus writing variable area, a DVD plus writing variable area, a DVD-RAM reading variable area, and a DVD-RAM writing variable area are predetermined in the variable memory 12. When an optical disk (not shown) is inserted, the optical disk drive identifies the type of the optical disk and sets up an initial value of variables required to read the optical disk and stores these variables at corresponding address in the variable memory 12.

[0007] For example, when an optical disk is inserted, the optical disk drive reads general data required to read the optical disk and set up the initial value of variables and stores them into the common variable area of the variable memory 12. If the optical disk is identified as a CD, the optical disk drive sets up reading variables required to read the optical disk and stores them into the CD reading variable area of the variable memory 12. If the optical disk is further identified as a writable CD, the optical disk drive sets

up the writing variables required by CD-R/CD-RW and stores them into the CD writing variable area in the variable memory 12. If the optical disk is found to be a DVD, the optical disk drive sets up reading variables required to read the optical disk and stores them into the DVD reading variable area of the variable memory 12. If the optical disk is further identified as being a writable DVD, the optical disk drive sets up the writing variables required by DVD-R/DVD-RW and stores them into the DVD minus writing variable area in the variable memory 12, or sets up the writing variables required by DVD+R/DVD+RW and stores them into the DVD plus writing variable area in the variable memory 12, according to the type of the DVD. If the optical disk is identified as being a DVD-RAM, the optical disk drive sets up reading variables required to read the optical disk and stores them into the DVD-RAM reading variable area of the variable memory 12, or sets up the writing variables required to write the optical disk and stores them into the DVD-RAM writing variable area in the variable memory 12.

[0008] As described above, the conventional optical disk pre-determines addresses in the variable memory 12 for storing different variables for reading and writing optical disks in

different types. The optical disk drive accesses variable areas corresponding to the type of the optical disk in the variable memory 12 when reading or writing optical disks. However, the optical disk can read or write only one optical disk at once, so that when reading or writing an optical disk, the optical disk drive can only access the variable area corresponding to the type of the optical disk, while the other variable areas in the variable memory 12 are invalid but still occupy space. The more types the optical disk drives supports, the larger the required space in the variable memory 12, which causes a waste on memory resources.

## **SUMMARY OF INVENTION**

[0009] It is therefore a primary objective of the present invention to provide a method for accessing a variable memory of an optical disk drive to solve the problems mentioned above.

[0010] Briefly summarized, a method for accessing a variable memory of an optical disk drive includes utilizing the optical disk drive to read data of an optical disk, identifying the type of the data, arranging reading variables from an initial address of the variable memory if the data is CD data, and arranging the reading variables from the initial address of the variable memory if the data is DVD data.

The CD data types are CDDA, VCD, CD-ROM, CD-R, and CD-RW, and the DVD data types are DVD-ROM, DVD-R, DVD-RW, DVD+R, DVD+RW, and DVD-RAM.

[0011] These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0012] Fig.1 illustrates the data arrangement of a variable memory of a conventional optical disk drive.

[0013] Fig.2 illustrates the data arrangement of a variable memory of an optical disk drive according to the present invention.

[0014] Fig.3 illustrates a flowchart of setting up variables of different types of optical disks.

#### **DETAILED DESCRIPTION**

[0015] Please refer to Fig.2 showing the data arrangement of a variable memory 22 of an optical disk drive according to the present invention. The optical disk drive (not shown) supports CDDA, VCD, CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-R, DVD-RW, DVD+R, DVD+RW, and DVD-RAM. The

variable memory 22 is for storing variables required to read and write optical disks of different types. Since the optical disk drive reads only one optical disk at once, the variable memory 22 can provide only the variables required to read and write the optical disk inside the optical disk drive, so that the variable memory 22 can be rearranged as shown in Fig.2. The variable memory 22 utilizes an SRAM of approximately 3KB, which can be divided into two areas according to the contents of data to be stored. A first area 24, using approximately 1KB, is for storing common reading variables. A second area 26 is for storing variables required to read and write optical disks of different types. When the optical disk drive reads another disk of a different type, the variables stored in the second area 26 are replaced by new variables. The common reading variables stored in the first area 24 are utilized when reading all kinds of optical disks. Thus, whatever the optical disk drive reads, the data stored in the first area will not be replaced.

[0016] Please refer to Fig.3 showing a flowchart of setting up variables of different types of optical disks. When an optical disk is inserted, the optical disk drive identifies the type of the optical disk. The optical disk types can be di-

vided into CD, DVD-RAM, and DVD. In a case of the disk being identified as a CD, the optical disk drive sets up an initial value of reading variables, reads a table of content (TOC) of the disk, then judges whether the CD is writable or not. If the disk is read-only such as a CD-ROM, the setup is finished. If the disk is writable, such as CD-R and CD-RW, the optical disk drive sets up an initial value of the writing variables and then reads recording data of the disk to finish the setup. In case of the disk being identified as a DVD-RAM, the optical disk drive sets up reading variables of the disk, reads lead-in data, sets up initial value of writing variables, and then reads recording data of the disk to finish the setup. In case of the disk being identified as a DVD, the optical disk drive sets up an initial value of reading variables, reads a lead-in data, and then judges whether the DVD is writable or not. If the disk is read-only such as a DVD-ROM, the setup is finished. If the disk is writable, such as DVD minus and DVD plus, the optical disk drive sets up initial value of the writing variables and then reads recording data of the disk to finish the setup.

[0017] Assume that at addresses 8000(H)–8C00(H) in the variable memory 22, the first area 24 uses 8000(H)–83FF(H) for



storing common reading variables and the second area 26 uses 8400(H)–8C00(H) for storing variables for reading and writing optical disks in different types. When a CD is inserted, the optical disk drive stores necessary reading variables beginning at 8400(H). If the CD is writable, such as CD–R or CD–RW, the optical disk drive stores necessary writing variables beginning at 8700(H). After reading and writing the CD, when a DVD is inserted, the optical disk drive stores necessary reading variables beginning at 8400(H) so that the new reading variables replace the originally stored area. If the DVD is writable such as DVD–R, DVD–RW, DVD+R or DVD+RW, the optical disk drive stores necessary writing variables beginning at 8700(H) so that the new writing variables replace the originally stored area. If a DVD–RAM is inserted, the optical disk drive stores necessary reading variables beginning at 8400(H) so that the new reading variables replace the originally stored are, and the optical disk drive also stores necessary writing variables beginning at 8700(H) so that the new writing variables replace the originally stored area.

[0018] As described above, the optical disk drive according to the present invention, stores the reading variables necessary to optical disks of different types in the same address 24

in the variable memory 22, and the writing variables necessary to optical disks of different types in another address 26 in the variable memory 22. When another disk is read, the new reading variables and writing variables will replace those originally stored. Therefore, even if the optical disk drive supports several types of optical disks, only the variable memory 22 of the same capacity is required. The first area 24 of the variable memory 22 is for storing common reading variables and the stored data will not be replaced. The second area 26 of the variable memory 22 is for storing reading and writing variables for different types of optical disks and can be replaced when another disk is inserted. And even the initial address of reading variables and writing variables for different disc type can be different.

[0019] In contrast to the prior art, the optical disk drive according to the present invention can utilize the variable memory in an effective manner. Since the optical disk drive can read and write only one optical disk at once, the variable memory for storing reading and writing variables can be repeatedly used. The conventional optical disk drive stores the variables at different addresses so that it requires a variable memory of larger capacity due to the in-

crease of supported types of optical disks, which uses only the variables corresponding to the disk inserted and causes a waste of memory space. The optical disk drive according to the present invention stores the variables at the same address in the variable memory so that even if the optical disk drive supports several types of optical disks, only the variable memory of the same capacity is required, conserving memory space effectively.

[0020] Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.